

MATH 150
Sample Exam 2
Answer Key

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1. Given that $p(x) = x^2 + kx + 10$ and that $p(x)$ divided by $(x + 3)$ has a remainder of 1, find the value of k .
- a. 0
 - b. 1
 - c. 3
 - d. 6**
 - e. none of the above
2. What is the minimum of $f(x) = 3x^2 + 12x + 10$?
- a. -3
 - b. -2**
 - c. 2
 - d. 3
 - e. none of the above
3. Assume the rat population of a city grows exponentially at a rate of 8.5% per month. How long will it take for the population to triple?
- a. 12.97 months
 - b. 12.92 months**
 - c. 16.78 months
 - d. 16.72 months
 - e. More information is needed
4. $\log_a 3 = 2$, $\log_a 2 = 1.5$, $\log_a 7 = 5$, find the $\log_a (21a^2 / 4)$
- a. 3
 - b. 4
 - c. 5
 - d. 6**
 - e. 10.5
5. Let p be directly proportional to x .
Let p be directly proportional to y^2 .
Let p be inversely proportional to the cube root of z .
If $p = 2$ when $x = 4$, $y = 2$ and $z = 27$,
then what is p when $x = -3$, $y = 1$ and $z = -7$?
- a. 0.59**
 - b. 2.03
 - c. 3.47
 - d. 4.28
 - e. none of the above

6. Solve $10^{-2x+2} = 100^{(x-3)(2x-3)}$.

- a. -3
- b. 2**
- c. 3
- d. 4
- e. none of the above

7. If $f(x) = (x^5 - 3)/2$, what does $f^{-1}(120)$ equal ?

- a. 2
- b. 3**
- c. 4
- d. 5
- e. None of the above

8. If you wanted to have \$3000 in 6 years, how much money would you need to place in an account that pays 6.8% annual interest compounded weekly?

- a. 1768.12
- b. 1859.56
- c. 1995.47**
- d. 2369.32
- e. None of the above

9. What is the remainder of $x^5 - 3x^3 + 5x - 1$ divided by $x - 1$?

- a. -4
- b. -1
- c. 2**
- d. 4
- e. None of the above

10. Show that $f(x) = (2x + 5) / (3 - x)$ is a one-to-one function.

Show if $f(a) = f(b)$ then $a = b$

Set: $(2a+5) / (3 - a) = (2b+5)/(3 - b)$

$(2a + 5)(3 - b) = (2b + 5)(3 - a)$

$6a - 2ab + 15 - 5b = 6b - 2ab + 15 - 5a$

$11a = 11b$

$a = b$

So, $f(x)$ is a 1-1 function

11. Find the inverse of $(2x + 5) / (3 - x)$.

$$y = (2x + 5) / (3 - x) \quad \text{interchange the x's and y's}$$

$$x = (2y + 5) / (3 - y)$$

$$x(3 - y) = 2y + 5 \quad \text{solve for y to get } f^{-1}(x)$$

$$3x - xy = 2y + 5$$

$$3x - 5 = xy + 2y$$

$$3x - 5 = (x + 2)y$$

$$(3x - 5) / (x + 2) = y = f^{-1}(x)$$

12. Let $f(x) = x^4 - 2x^3 + 2x^2 - 2x + 1$.

How many positive real roots can $f(x)$ have?

4, 2 or 0

How many negative real roots can $f(x)$ have?

0

How many complex roots can $f(x)$ have?

0, 2 or 4

Show that $x = 1$ is a double root (a root of multiplicity 2) and find the other roots.

$$(x^4 - 2x^3 + 2x^2 - 2x + 1) / (x - 1) = x^3 - x^2 + x - 1 \quad \text{(by synthetic division)}$$

$$(x^3 - x^2 + x - 1) / (x - 1) = x^2 + 1 \quad \text{(by synthetic division)}$$

**And you can use quadratic formula to find
the 2 remaining roots of $x = i$ OR $-i$.**